



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

TRANSACTIONS  
OF THE  
AMERICAN PHILOSOPHICAL SOCIETY.

HELD AT PHILADELPHIA,

FOR PROMOTING USEFUL KNOWLEDGE.

---

VOL. X.—NEW SERIES.

---

PUBLISHED BY THE SOCIETY.

---

Philadelphia:  
WILLIAM S. YOUNG, PRINTER,—NO. 50 NORTH SIXTH STREET.  
1853.

## EXTRACT

### FROM THE LAWS OF THE SOCIETY RELATING TO THE TRANSACTIONS.

---

1. The Transactions shall be published in numbers, at short intervals, under the direction of the Committee of Publication.
2. Every communication to the Society, which may be considered as intended for a place in the Transactions, shall immediately be referred to a committee to consider and report thereon.
3. If the committee shall report in favour of publishing the communication, they shall make such corrections therein as they may judge necessary to fit it for the Press; or, if they shall judge the publication of an abstract or extracts from the paper to be most eligible, they shall accompany their report with such abstract or extracts. But if the author do not approve of the corrections, abstracts, or extracts, reported by the committee, he shall be at liberty to withdraw his paper.
4. The order in which papers are read before the Society shall determine their places in the Transactions, priority of date giving priority of location.

### COMMITTEE OF PUBLICATION.

CHARLES B. TREGO,  
ALFRED L. ELWYN,  
JOHN F. FRAZER.

OFFICERS  
OF THE  
AMERICAN PHILOSOPHICAL SOCIETY,  
FOR THE YEAR 1853.

---

PATRON, . . . . .	His Excellency the Governor of Pennsylvania.
PRESIDENT, . . . . .	Franklin Bache.
VICE PRESIDENTS, . . . . .	{ Alexander Dallas Bache, John K. Kane, Robley Dunglison.
SECRETARIES, . . . . .	{ John F. Frazer, Charles B. Trego, E. Otis Kendall, Frederick Fraley.
COUNSELLORS, elected for three years. In 1851, . . . . .	{ Clement C. Biddle, George M. Justice, Frederick Fraley, Henry Reed.
In 1852, . . . . .	{ Thomas Biddle, Isaac Lea, Hartman Kuhn, A. L. Elwyn.
In 1853, . . . . .	{ Isaac Hays, Charles D. Meigs, Henry Vethake, Jacob G. Morris.
CURATORS, . . . . .	{ Franklin Peale, John C. Cresson, M. Fisher Longstreth.
TREASURER and LIBRARIAN, . . . . .	Charles B. Trego.

LIST OF MEMBERS  
OF THE  
AMERICAN PHILOSOPHICAL SOCIETY,

*Elected since the Publication of the Ninth Volume.*

---

Richard S. M'Culloh, of Philadelphia.	John Goodsir, Esq., of Edinburgh.
Ceva Grimaldi, Marquis of Pietracatella, of Naples.	Francis Kiernan, Esq., of London.
A. T. Kupffer, of St. Petersburg.	John Hughes Bennett, M. D., of Edinburgh.
U. J. Leverrier, of Paris.	A. A. Gould, M. D., of Boston.
John Y. Mason, of Virginia.	Joseph Leidy, M. D., of Philadelphia.
Richard A. Tilghman, of Philadelphia.	W. S. W. Ruschenberger, M. D., U. S. N., Philadelphia.
William Procter, Jr., of Philadelphia.	Stephen Colwell, of Philadelphia.
John F. James, of Philadelphia.	John H. Towne, of Philadelphia.
Robert Baird, D. D., of New York.	Dr. Charles M. Wetherill, of Philadelphia.
J. Melville Gilliss, U. S. N., Washington.	Joel B. Reynolds, of Philadelphia.
J. C. Adams, St. John's College, Cambridge, England.	Thomas S. Kirkbride, M. D., of Philadelphia.
Professor Asa Gray, Cambridge, Massachusetts.	Don Lucas Alaman, of Mexico.
Gustav Adolph Jahn, of Leipsic.	Benjamin Apthorp Gould, Jr., of Cambridge, Mass.
Robert C. Grier, Judge of U. S. Supreme Court.	George M. Totten, of Philadelphia.
Professor Simon Greenleaf, of Cambridge, Mass.	Joseph W. Farnum, M. D., of New York.
William Kent, of New York.	Henry A. Boardman, D. D., of Philadelphia.
William L. Storrs, of Connecticut.	Thomas D. Mütter, M. D., of Philadelphia.
Hon. Joel Jones, of Philadelphia.	Caspar Morris, M. D., of Philadelphia.
John Reed, of Carlisle, Pennsylvania.	William Pepper, M. D., of Philadelphia.
Alexander H. Stevens, M. D., of New York.	Isaac Hazlehurst, of Philadelphia.
Harmar Denny, of Pittsburgh.	Peter M'Call, of Philadelphia.
Ralph J. Ingersoll, of Connecticut.	Joseph Pancoast, M. D., of Philadelphia.
John N. Conyngham, of Pennsylvania.	Jacob G. Morris, of Philadelphia.
Charles Picot, of Philadelphia.	Robert Patterson, of Philadelphia.
E. Geddings, M. D., of South Carolina.	Professor Francesco Cav. Zantedeschi, of Padua.
M. Calderon de la Barca, of Washington.	Daniel Kirkwood, of Pottsville.
F. A. Pouchet, M. D., of Rouen, France.	Professor William Chauvenet, of Annapolis.
M. Fisher Longstreth, of Philadelphia.	Hon. George Sharswood, of Philadelphia.
Samuel F. B. Morse, of New York.	John Le Conte, of New York.
Professor E. N. Horsford, of Cambridge, Massachusetts.	Edward Hallowell, M. D., of Philadelphia.
Hon. George P. Marsh, of Vermont.	Elisha K. Kane, M. D., of Philadelphia.

James Dundas, of Philadelphia.  
Isaac R. Davis, of Philadelphia.  
Francis Gurney Smith, M. D., of Philadelphia.  
John Forsyth Meigs, M. D., of Philadelphia.  
Edward King, of Philadelphia.  
George N. Eckert, of Philadelphia.  
Lieutenant Charles Henry Davis, U. S. Navy.  
Professor J. W. Bailey, of West Point.  
M. Michel Chevalier, of Paris.  
Alfred Stillé, M. D., of Philadelphia.  
John Neill, M. D., of Philadelphia.  
John J. Reese, M. D., of Philadelphia.  
Prof. J. S. Hubbard, of Nat. Observatory, Washington.  
Prof. W. C. Bond, of Cambridge, Massachusetts.  
Thomas B. Wilson, M. D., of Philadelphia.  
John Cassin, of Philadelphia.  
John H. Alexander, of Baltimore.  
Lieutenant M. F. Maury, U. S. Navy.  
A. L. Crelle, of Berlin.  
C. F. Gauss, of Göttingen.

B. Aug. Cauchy, of Paris.  
J. Liouville, of Paris.  
Dr. J. G. Flügel, U. S. Consul, Leipsic.  
Professor O. M. Mitchell, of Cincinnati.  
Robert M. Bird, M. D., of Philadelphia.  
John L. Le Conte, M. D., of Philadelphia.  
Edward E. Law, of Philadelphia.  
Captain W. F. Lynch, U. S. Navy.  
Hon. John P. Kennedy, Secretary of the Navy.  
Major Alfred Mordecai, U. S. Army.  
Thomas L. Patterson, Chief Eng'r Ches. and Ohio Canal.  
Henry Grinnell, of New York.  
John B. Biddle, M. D., of Philadelphia.  
Dr. Marshall Hall, F. R. S., London and Edinburgh.  
Dr. Alexander Fischer von Waldheim, of Moscow.  
Dr. Basile Sakharoff, of St. Petersburgh.  
Dr. Peter Strelkowsky, of St. Petersburgh.  
Dr. Charles Dworjak, of St. Petersburgh.  
Fred. Geo. William de Struve, of St. Petersburgh.  
Charles D. Arfwedson, U. S. Consul, of Stockholm.